

# Comparison of the Dietary Intakes of New Parents, Second-Time Parents, and Nonparents: A Longitudinal Cohort Study

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## ABSTRACT

The objective of this study was to examine the dietary intake profiles of first-time parents, second-time parents, and couples without children; once during pregnancy, then at 6- and 12-months postpartum. This was an observational, longitudinal, cohort study. Participants were a community-based sample of 153 couples aged 25 to 40 years. Data were collected between 2007 and 2011. Dietary intake was recorded using 3-day dietary recall. Hierarchical linear modeling was used to compare the dietary intakes of groups (ie, parent, sex, and couple days) over time. Percentage of participants per group meeting recommended daily dietary guidelines was also analyzed, as were variables that influenced meeting overall recommended guidelines using a multivariate analysis of variance. First-time mothers had higher overall energy, fat, sugar, fruit, and milk intake compared with women without children, and longitudinally first-time mothers decreased their fruit intake. Second-time mothers had higher overall energy, fat, sugar, and fruit intake compared with nonparent women, and longitudinally second-time mothers increased their meat intake. First-time fathers had overall higher bread intake compared with second-time fathers and men without children, and first-time fathers consumed less sugar than second-time fathers. Longitudinally, first-time fathers increased their fiber intake. At any stage of data collection, from pregnancy to 12-months postpartum, only 2% to 16% of all mothers met recommended overall daily dietary guidelines. The only variable investigated that influenced meeting overall daily dietary guidelines at baseline was parent status.

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THERE ARE NUMEROUS BENEFITS TO A HEALTHY dietary intake, including reduced risk of cardiovascular disease and premature all-cause mortality.<sup>1,2</sup> It is especially important for pre- and postnatal women (and their infants) to have healthful diets. Studies have shown that human beings have sensitive windows for healthy dietary intake in terms of later outcomes. For example, inadequate maternal intake during critical periods in fetal development may contribute to cardiovascular disease in the child's later years.<sup>3,4</sup> Perinatal diet influences proper neurodevelopment and bone mineralization into mid-childhood.<sup>5</sup> There is also evidence supporting the concept of nutritional programming such that early dietary intake may influence adaptive changes in gene expression in adulthood.<sup>3,5</sup> Regarding behavior-related benefits, there is also a modest correlation between parents' dietary intake and that of their preschool children<sup>6</sup> and dietary intake seems to track from childhood well into the adult years.<sup>7</sup>

The transition to parenthood can have a large influence on health and health-promoting behaviors<sup>8-13</sup>; for example, decreased physical activity and increased body mass,<sup>11,14-18</sup> as well as decreased sexual functioning of fathers. Dietary

intake may also be affected by becoming a parent; however, the direction of results appears less clear. A cross-sectional study (using telephone interviews) where researchers investigated the dietary intake of low-income women during early pregnancy with their first child reported that women scored low on the Dietary Quality Index score for pregnancy (compared with norms), which resulted from a high percent fat intake of total energy, greater than recommended energy intake, and inadequate calcium and iron intake.<sup>19</sup> These women all consumed at least the recommended servings of grain, vegetables, and meat; however, most did not meet the recommended daily guidelines of fruit and milk servings.<sup>19</sup> By contrast, a cross-sectional survey of middle-income (and mostly educated) women who were 3 to 6 months postpartum found that a large percentage of women had adequate intakes of meat (79%), milk (66%), and fruit (51%), but not vegetables (24%) and bread (14%) (compared with norms).<sup>20</sup> Further, a review of parents' health behaviors reported that they referred to a raised consciousness of their health habits as a result of having a child.<sup>21</sup>

Dietary intake behaviors have also been compared between parents and nonparents. Mothers with children aged 5

years reported greater intake of sugar-sweetened beverages, total energy, and percent of saturated fat compared with age-matched women without children; however, there was no difference in dietary intake between fathers and men without children.<sup>15</sup> The presence of children younger than age 17 years in the home was associated with higher total fat and saturated fat intake among parents, which was not affected by age or sex of the adults.<sup>22</sup> Parents have also been reported to skip meals less frequently than couples without children.<sup>23</sup> The only prospective cohort study tracked women from pregnancy to 2 years postpartum. Women were asked to compare quantity of food intake between 0 and 6 months postpartum and 7 to 12 months postpartum by answering the question, "How has the amount of food you eat now (at 12 months postpartum) changed compared with the first 6 months since you had your baby?" Most women reported either decreasing or not changing their food intake.<sup>24</sup> However, a significantly larger proportion of women were consuming 3 or more fruits and vegetables each day and eating breakfast daily at 24 months postpartum, compared with before their pregnancy.<sup>25</sup> The lack of cohort comparisons over time, limited research on fathers, and mixed findings from existing studies point to a need for research on dietary intake during the transition to parenthood and early years of parenthood.

The purpose of this study was to examine the dietary intake profiles of three cohorts of couples from pregnancy to 12 months postpartum. The cohorts were first-time parents during the first year of parenthood, second-time parents during the first year of parenting with a second child, and couples without children. The study objectives were to compare the dietary intake profiles of first-time parents, second-time parents, and couples without children at baseline (pregnancy for parents) and over time (6 months postpartum and 12 months postpartum), as well as to examine the extent to which dietary intake varied by sex and parent status; and to evaluate the proportion of participants (by parent group and sex) meeting recommended daily Canadian dietary guidelines across time, and variables that influenced meeting overall recommended guidelines for parent–sex groups.

## METHODS

### Procedure

Recruitment and data collection took place between January 2007 and January 2011 in two western Canadian cities. Participants were recruited at baby fairs; via posters or pamphlets in baby stores, prenatal classes, parenting service and health care centers, community centers, libraries, and coffee shops; via advertisements in newspapers and online; and via word of mouth (snowball). The study protocol was approved by the University's Human Research and Ethics Review Board and all participants provided written informed consent.

Interested couples contacted the researchers and underwent telephone screening to determine eligibility. Couples were eligible if they were between ages 25 and 40 years and belonged to one of the following three groups: couples expecting their first child, couples expecting their second child, and couples (married/common-law) without children. Couples became ineligible and were not included in the final sample if they experienced health complications due to

pregnancy or birth (eg, gestational diabetes, pre-eclampsia, and bed rest). Dietary intake was measured once during pregnancy, at 6 months postpartum, and at 12 months postpartum. Couples without children were assessed at 6-month intervals. A package with measurement tools (a 3-day dietary recall and a demographics questionnaire) was mailed to participants' homes and returned to the investigators. Participants received a T-shirt after completion of baseline measurements, as well as a \$25 per person honorarium that increased by \$5 for each subsequent wave of measures completed.

### Measurements

**Three-Day Dietary Recall.** Dietary intake was recorded for 3 consecutive days: 2 weekdays, and 1 weekend day in the 3-day dietary recall. The validity<sup>26,27</sup> and reliability<sup>28</sup> of the 3-day dietary recall has been previously established in adult populations. The 3-day dietary recall included detailed instructions and examples of how to record dietary intake of food and beverage (ie, type, name brand, ingredients of recipes or components of "combination foods," and amounts in volume, weight, or size). Data from the 3-day dietary recall was entered into The Food Processor (The Food Processor version 10.2.0, 2008, ESHA Research). The Food Processor estimates dietary nutrient content and uses the Canadian Nutrient File<sup>29</sup> to estimate servings from the food groups according to Canada's Food Guide to Healthy Eating.<sup>30</sup> Nutritional variables assessed were: overall energy, fiber, sugar, fat, bread servings, fruit servings, vegetable servings, milk servings, and meat servings.

**Demographics Questionnaire.** The questionnaire included a total of nine questions on demographics (eg, age, race, and parent status) and healthy lifestyle practices (eg, smoking). The questionnaire was developed by the primary investigators and has been used in previous studies.

### Statistical Analysis

Data from The Food Processor were analyzed in SPSS (version 19.0, 2010, IBM-SPSS Inc); a *P* value of 0.05 was used to determine statistical significance. Descriptive findings were generated for the demographic and clinical variables by couple status followed by the calculation of attrition rates. Given the nested structure of the data (ie, individual repeated assessments [Level 1] nested within the couple [Level 2]), hierarchical linear modeling was used.<sup>31,32</sup> This analysis could readily incorporate all participants who provided at least one data point (eg, a baseline assessment) under the missing at random assumption.<sup>31</sup> For a given nutrition variable, a Level 1 no intercept model was specified such that a main effect was entered if the participant was a man (0=woman and 1=man), woman (0=man and 1=woman), a linear trend toward men (0=baseline, 1=6 months, and 2=12 months), and a linear trend toward women with all coefficients set to random. In this model, the main effects for the mens' and womens' intercepts represented their respective baseline levels for a given dietary variable, whereas the linear trends represented the change in a given dietary variable over each 6-month interval. At Level 2, the parent status variables were entered into the regression to predict all Level 1 coefficients controlling for age, education, and employment. Specifically,

three dummy coded variables were created: nonparents (0=no and 1=yes), first-time parents (0=no and 1=yes), and second-time parents (0=no and 1=yes). Then, cross-level interactions were created such that first-time parent and second-time parent variables predicted the mens' and womens' Level-1 intercepts (ie, to determine whether baseline levels for a given dietary outcome were similar for couples without children vs first-time parents vs second-time parents) and the mens' and womens' slopes (ie, to determine whether the change in a given dietary outcome was similar for couples without children vs first-time parents vs second-time parents) at Level 1. Follow-up analyses were then conducted excluding second-time parents to make the first-time parent vs second-time parent comparisons. Finally, the parental coefficients were statistically compared using the multivariate hypothesis testing procedure to determine whether the magnitude of their potential associations with the Level-1 intercepts and slopes were similar for men and women.

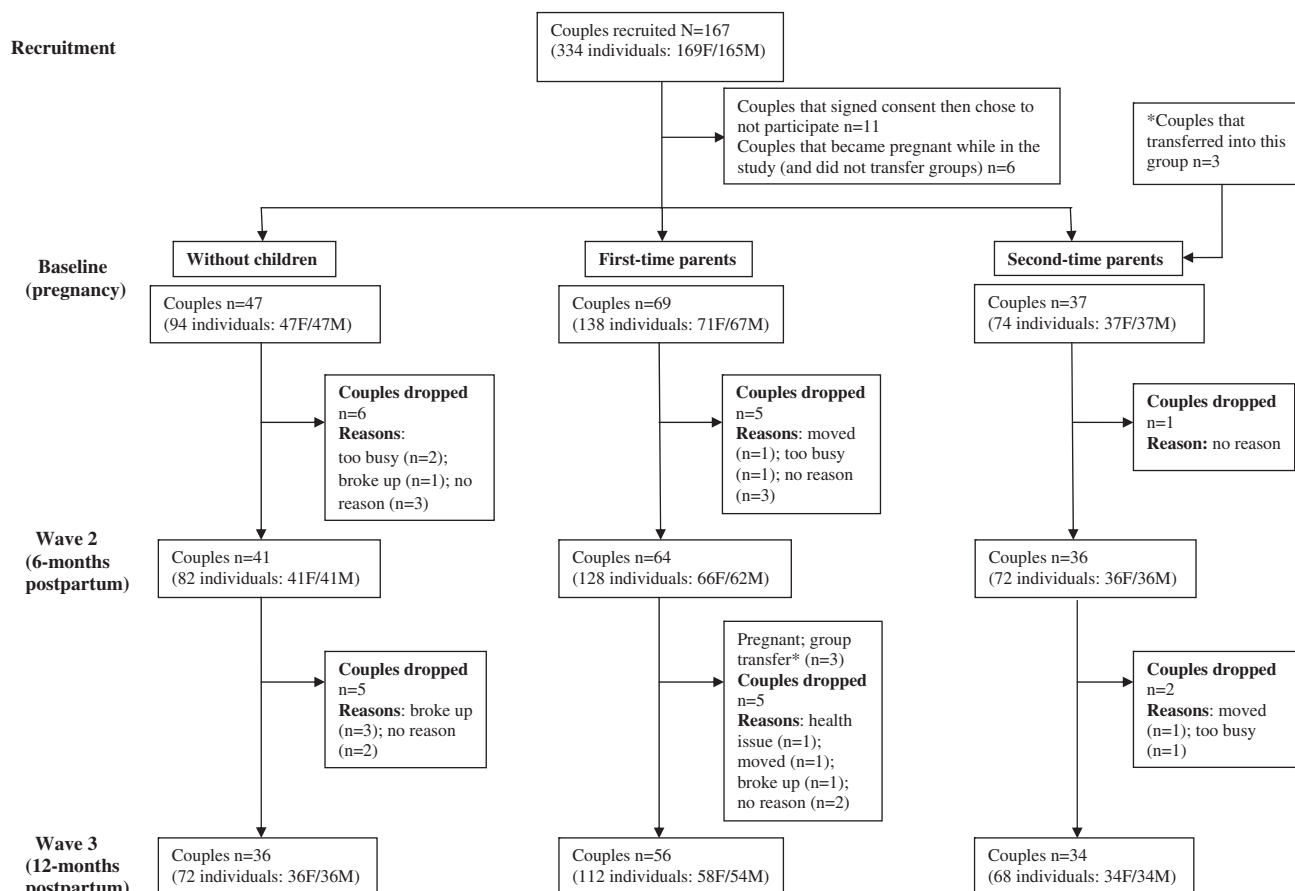
Meeting recommended daily dietary guidelines for adults aged 19 to 50 years was defined as consuming the following number of servings per day: 2 dairy, 7 to 8 fruits and vegetables for women and 8 to 10 for men, 6 to 7 breads for women and 8 for men, and 2 meat/protein for women and 3 for men.<sup>30</sup> For pregnant and postpartum women, meeting

recommended daily dietary guidelines meant meeting the aforementioned minimum for each food group, plus 2 to 3 servings from any food group.<sup>30</sup> Data were reported as percent of participants per parent and sex group that met the minimum daily serving requirements for each food group, as well as overall (ie, meeting recommended daily dietary guidelines for all food groups plus 2 to 3 servings from any group for pregnant and postpartum women). Variables (eg, sex, couple group, age, employment status, education, and household income) that affected meeting overall guidelines were examined using a multivariate analysis of variance.

**RESULTS AND DISCUSSION**

**Sample Characteristics**

A total of 153 couples completed baseline measures. Twelve couples did not return for the 6-month postpartum data collection (an 8% attrition rate). Two couples were women-only couples; both were in the first-time parents' group. See the Figure for retention numbers and drop-out reasons. Couples without children were younger, had lower household income, lower body mass index, and were more likely to be unemployed than couples expecting their first or second child. There were no differences across groups on



**Figure.** Participant flow through a study examining the dietary intake profiles of first-time parents, second-time parents, and couples without children. \*Couples became pregnant with second child while participating in the study as first-time parents and chose to continue participating as second-time parents. F=female. M=male.

**Table 1.** Daily dietary intake by parent and sex group across time, in a study examining the dietary intake profiles of first-time parents, second-time parents, and couples without children

Group	Total energy overall (kcal)	Fat (g)	Fiber (g)	Sugar (g)	Bread (servings)	Fruit (servings)	Vegetable (servings)	Milk (servings)	Meat (servings)
<i>mean ± standard deviation</i>									
<b>Women</b>									
<b>Without children</b>									
Baseline (n=47)	2,002±516	71.5±25.2	24.6±11.6	90.5±41.2	6.7±2.8	2.1±1.3	4.1±2.5	1.9±0.9	1.8±1.0
6-mo postpartum (n=41)	1,948±499	76.8±21.3	25.5±11.2	89.4±38.8	6.5±2.9	2.3±1.4	4.0±2.3	1.4±0.8	1.9±1.2
12-mo postpartum (n=36)	1,895±523	65.4±21.9	25.8±11.1	86.9±33.9	5.7±2.9	2.2±1.5	4.5±2.8	1.7±0.9	1.6±0.9
<b>First-time parent</b>									
Baseline (pregnancy) (n=71)	2,579±799	80.4±26.1	27.9±9.7	111.7±36.8	7.9±2.8	3.5±2.2	4.8±2.5	2.1±1.1	1.9±0.8
6-mo postpartum (n=66)	2,515±712	87.8±27.7	28.6±11.4	103.9±37.6	7.0±3.0	2.9±1.7	4.1±2.8	2.0±1.0	1.9±0.9
12-mo postpartum (n=58)	2,701±894	81.6±28.6	27.2±10.6	93.4±36.9	6.9±3.1	2.5±1.6	4.1±3.5	1.7±1.1	1.7±0.8
<b>Second-time parent</b>									
Baseline (pregnancy) (n=37)	2,377±618	83.7±25.9	29.2±9.0	131.4±63.0	6.5±3.5	3.4±2.4	3.6±3.8	2.0±1.1	1.7±0.9
6-mo postpartum (n=36)	2,232±631	86.6±35.7	28.2±13.5	106.5±38.9	5.9±2.3	2.6±1.9	4.0±3.6	1.4±0.8	1.8±1.0
12-mo postpartum (n=34)	2,212±724	80.2±33.0	26.3±10.0	110.6±57.2	5.7±3.0	2.7±2.0	3.8±2.8	1.5±1.2	2.1±1.2
<b>Men</b>									
<b>Without children</b>									
Baseline (n=47)	2,659±820	98.6±37.9	30.3±12.7	108.3±45.7	8.9±3.1	2.5±1.8	4.4±2.4	1.9±1.2	3.0±1.9
6-mo postpartum (n=41)	2,447±957	89.1±38.0	28.2±13.1	104.8±58.8	7.6±3.7	2.8±2.4	3.6±2.2	1.9±1.5	2.6±1.8
12-mo postpartum (n=36)	2,393±759	79.7±31.2	27.8±12.2	101.5±58.9	7.9±3.3	2.6±2.4	4.2±2.5	1.7±1.1	2.3±1.3
<b>First-time parent</b>									
Baseline (pregnancy) (n=67)	2,579±799	96.3±36.4	28.1±10.8	103.3±51.5	9.4±3.2	2.7±1.9	4.7±2.8	2.2±1.4	2.9±1.5
6-mo postpartum (n=62)	2,515±712	96.5±32.2	27.6±10.4	99.9±56.9	8.0±3.3	2.6±1.8	4.7±2.9	1.8±1.1	2.4±1.4
12-mo postpartum (n=54)	2,701±894	103.0±45.9	32.2±12.7	104.0±50.2	9.4±5.5	2.3±1.9	4.2±2.5	2.1±1.4	2.5±1.5
<b>Second-time parent</b>									
Baseline (pregnancy) (n=37)	2,711±654	97.5±25.9	27.1±8.7	132.2±82.8	7.1±3.5	2.2±1.6	4.0±3.0	2.3±1.6	2.9±1.7
6-mo postpartum (n=66)	2,454±685	89.2±28.7	27.2±13.4	113.4±60.1	6.1±2.8	2.0±1.4	4.3±3.7	1.6±0.9	2.2±1.3
12-mo postpartum (n=34)	2,487±615	83.2±27.1	26.9±12.9	111.2±50.1	6.6±2.3	2.2±1.8	2.7±1.9	1.5±1.1	2.2±1.4

educational achievement, visible minority status (ie, white vs nonwhite [Asian, Indian, or Mexican]), or health condition profiles.

**Baseline**

Compared with couples without children, first-time women parents had significantly higher overall energy ( $\beta=.13$ ), fat ( $\beta=.14$ ), sugar ( $\beta=.20$ ), fruit ( $\beta=.36$ ), and milk ( $\beta=.17$ ) intake. Compared with women without children, second-time women parents had significantly higher overall energy ( $\beta=.20$ ), fat ( $\beta=.17$ ), sugar ( $\beta=.29$ ), and fruit ( $\beta=.23$ ) intake. (See Table 1 for descriptive statistics of dietary intake at baseline and over time.) This is congruent with past research, whereby mothers reported higher overall energy and fat intake than women without children,<sup>19</sup> and higher total fat intake was reported in parents with children 17 or younger living at home.<sup>22</sup>

Compared with men without children, second-time men parents consumed significantly less bread ( $\beta=-.20$ ); compared with second-time men parents, first-time men parents consumed significantly less sugar ( $\beta=-.32$ ) and more bread ( $\beta=.29$ ). These results conflict with those of Berge and colleagues<sup>15</sup> who reported no difference in dietary intake between fathers and men without children.

**Longitudinal (Rate of Change/Linear Trends)**

From pregnancy to 12 months postpartum, first-time women parents decreased their fruit intake ( $\beta=-.17$ ), whereas fruit intake remained stable in women without children. This somewhat contrasts with findings that reported that significantly more women were consuming 3 or more fruits and vegetables each day during pregnancy, compared with before pregnancy.<sup>25</sup> Recommended daily dietary guidelines suggest a minimum consumption of 7 fruits and vegetables each day, so even if there was an increased fruit and vegetable intake by participants in the study by Olson,<sup>25</sup> it is unknown whether or not pregnant women were consuming sufficient quantities. Also, second-time women parents increased their meat intake ( $\beta=.08$ ). From pregnancy to 12 months postpartum, first-time men parents increased their fiber intake ( $\beta=.12$ ); and all men decreased their fat intake ( $\beta=-.20$ ). This is the first study to report longitudinal findings on new fathers.

**Meeting Recommended Daily Serving Guidelines**

Only 16% of first-time mothers met the recommended daily dietary guidelines during pregnancy, 10% at 6 months postpartum, and 2% at 12 months postpartum. Nine percent of second-time mothers met the recommended daily dietary

**Table 2.** First-time parents, second-time parents, and couples without children meeting recommended Canadian daily dietary guidelines (food servings)

Variable	Without Children		First-Time Parents		Second-Time Parents	
	Women	Men	Women	Men	Women	Men
<b>Baseline (pregnancy) (n)</b>	47	47	71	67	37	37
Age (mean $y \pm$ standard deviation)	27.3 $\pm$ 5.2	29.2 $\pm$ 5.3	31.1 $\pm$ 4.8	33.1 $\pm$ 4.7	32.3 $\pm$ 3.9	34.2 $\pm$ 4.9
Personal income (mean \$ $\pm$ standard deviation)	32,923 $\pm$ 20,518	39,417 $\pm$ 21,489	45,303 $\pm$ 24,345	52,438 $\pm$ 29,342	44,671 $\pm$ 56,678	57,150 $\pm$ 46,300
Meeting daily guidelines—dairy (%)	53	53	54	56	63	59
Meeting daily guidelines—meats (%)	38	44	52	47	47	47
Meeting daily guidelines—fruits and vegetables (%)	36	33	65	38	46	26
Meeting daily guidelines—breads (%)	55	62	84	64	57	37
<b>Wave 2 (6-mo postpartum) (n)</b>	41	41	66	62	36	36
Meeting daily guidelines—dairy (%)	23	37	58	51	44	31
Meeting daily guidelines—meats (%)	43	34	55	28	56	38
Meeting daily guidelines—fruits and vegetables (%)	38	32	48	33	41	19
Meeting daily guidelines—breads (%)	58	42	60	54	28	22
<b>Wave 3 (12-mo postpartum) (n)</b>	36	36	58	54	34	34
Meeting daily guidelines—dairy (%)	35	46	42	55	39	27
Meeting daily guidelines—meats (%)	40	20	43	23	59	33
Meeting daily guidelines—fruits and vegetables (%)	38	29	43	27	47	13
Meeting daily guidelines—breads (%)	38	51	66	54	53	37



guidelines during pregnancy, 3% at 6 months postpartum, and 10% at 12 months postpartum. (See Table 2 for percentage of participants in each parent–sex group meeting recommended daily serving guidelines for each food group.) A multivariate analysis of variance examined job status at baseline (no employment, part-time, and full-time employment), age, education, and household income as covariates; parent status and sex as independent variables; and meeting overall dietary guidelines at baseline, 6 months postpartum, and 12 months postpartum as dependent variables. A significant multivariate effect was found for parent status and meeting overall dietary guidelines at baseline. All other interactions were not significant.

Limitations in this study include the following. Data on dietary intake were obtained with a 3-day self-report tool. The time period during which dietary intake was reported may have been convenient, although anomalous and not reflective of usual intake. Research on self-reported dietary intake indicates that participants tend to underreport<sup>33</sup>; women more so than men, and more prevalently among participants who are less educated.<sup>34</sup> If not enough description was provided for a food item, a default version of the item was entered. For example, if someone wrote “apple” without further description, a medium-sized, red apple was chosen. If a couple in the first-time parent group became pregnant a second time, they had the option of transferring to the second-time parent group. This transfer occurred with three couples. As a result, three couples are represented twice; once in each parent group. Data were only collected until 12 months postpartum; results cannot be extrapolated beyond that. Between the 6- and 12-month time points, many participants who were on leave returned to their paid jobs (91 participants took leave; average 26 weeks); therefore, a change in dietary intake may be reflective of returning to employment. Lastly, this was a homogenous sample of educated, middle-income couples; the findings may not be extrapolated to samples of low income, minority, or noneducated couples.

## CONCLUSIONS

To date, most studies on dietary intake of new parents have been heavily focused on mothers, although seldom compared to women without children, and never to second-time mothers. Ours was the first study to evaluate the dietary intakes of fathers longitudinally and compare them to men without children. First-time mothers had higher overall energy, fat, sugar, fruit, and milk intake compared to women without children, and longitudinally first-time mothers decreased their fruit intake. Second-time mothers had higher overall energy, fat, sugar, and fruit intake compared to women without children, and longitudinally second-time mothers increased their meat intake. First-time fathers had overall higher bread intake compared with second-time fathers and nonparent men, and first-time fathers consumed less sugar than second-time fathers. Longitudinally, first-time fathers increased their fiber intake. At any stage of data collection, from pregnancy to 12 months postpartum, only 2% to 16% of all mothers met recommended overall daily dietary guidelines. Results from this study support the need for prenatal and/or preconception education interventions<sup>35-37</sup> that target periods before, during, and after pregnancy.

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## STATEMENT OF POTENTIAL CONFLICT OF INTEREST

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